

**Driving Reduction/Cessation Among Older Drivers:  
Toward a Behavioral Framework**

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## 1. INTRODUCTION

The overall population of the United States is aging, as is the driver population. In 1977, 10% of all drivers were over age 65 (FHWA, 1978). By 1997, this portion had increased to 14% (FHWA, 1998) and by 2020, 20% of licensed drivers are expected to be 65 or older (Chu, 1994). The growing number of aging drivers presents a particular problem to American society because mobility, an important element in maintaining quality of life, is often equated with the ability to drive. The dispersed land-use patterns in the United States, the growth of suburbs, and the present transportation system have made Americans so dependent on the automobile that it has become not only a mode of transportation, but also a perceived necessity for maintaining independence, autonomy, and in some cases, self-esteem.

As people age, however, driving an automobile safely can become more difficult, with the physical changes associated with aging and disease often affecting a person's ability to see, hear, process information, and react in a timely manner. Because of these changes, older drivers become increasingly faced with decisions about reducing or even stopping driving, and because of the large size of this cohort, their mobility decisions will have a profound effect on the transportation system as a whole. Understanding the process people go through as their driving abilities decline will facilitate efforts to help older drivers continue driving as long as it is safe, and to make appropriate and acceptable decisions regarding reduction or stopping driving. Such an understanding will also help facilitate efforts to provide acceptable ways to meet older drivers' mobility needs when they can no longer drive.

There is little historical data on the driving reduction and cessation process among older drivers. Earlier cohorts of older drivers were much smaller and the land-use patterns and transportation systems were not as automobile-oriented as they are now. Many older persons of previous generations never held driving licenses, and lived in areas served by transit which they used and continued to use as they aged. However, the present cohort of older drivers in the United States matured with the automobile, became dependent on it, and is very reluctant to give it up in favor of public transportation services.

A number of studies have identified factors associated with driving reduction and cessation. For example, driving reduction and cessation has been associated with declining health and functional status (Campbell et al., 1993; Marottoli et al., 1993), age (Forrest et al., 1997; Jette and Branch, 1993), gender (Rosenbloom, 1988), avoidance of driving under certain conditions, avoidance of specific driving maneuvers, and discomfort or nervousness in various driving situations (Benekahal et al., 1994; Lonero et al., 1994; Kington, et al., 1994; Persson, 1993; Stewart et al., 1993).

Little, however, has been done to develop a comprehensive theoretical framework that might lead to a model of driving reduction and cessation. Observations of the process can provide a starting point for this. For example, an interesting observation of the driving reduction and cessation process among older drivers is that some drivers continue to drive even though their physical skills have diminished, while others, with the same physical skills, appear to stop driving voluntarily. This observation leads one to speculate that perhaps drivers first have to acknowledge that they are having problems with their driving abilities before they can contemplate stopping driving.

The degree to which drivers recognize or anticipate problems may well be an underlying factor in the driving reduction and cessation process. Some older drivers may be experiencing few driving-related problems, do not anticipate any in the near future, and continue to drive. Some drivers may have experienced age-related declines in driving ability, have restricted driving under some conditions, and can anticipate a time when they may have to stop driving. Others may be experiencing so many age-related problems that they can clearly anticipate a time when they will have to stop driving. Still others may be reluctant to admit that they have problems or simply assume that they will die before they have to make the decision to stop driving.

Because the process of driving reduction and cessation is fundamentally a process of behavior change, it makes sense to examine older driver decisions related to reducing and stopping driving within a framework of behavior change. This paper takes the first steps toward adapting a theoretical behavior-change model to the driving reduction and cessation process among older drivers by testing a critical assumption about the process. The assumption is that the anticipation of driving ability problems is an essential factor in the driving reduction and cessation process. The intent of the paper is to increase understanding of the process and to start developing a behavioral framework that can be used in identifying intervention opportunities to help design and plan programs, options, and services for the mobility of the anticipated new cohort of older drivers.

## **2. BEHAVIOR-CHANGE MODELS**

The public health field strives to prevent or change behaviors that constitute risks to the population and, as such, has generated several theoretical behavior-change models. Because driving beyond the time that one is able to do so safely is a risky behavior, a number of behavior-change models from health behavior theories were examined to determine if they might provide appropriate conceptual frameworks for older driver behavior (Glanz et al., 1997).

The Transtheoretical Model (Prochaska, 1994; Prochaska and Velicer, 1997) has several appealing features. The model assumes that behavior change follows a set of stages including precontemplation, contemplation, preparation, action, maintenance, and termination. The model also identifies processes of change, described as covert and overt activities that people use to progress through the stages. The model assumes that people use different processes of change in different stages of change. In addition to the stages and processes of change, key constructs of the model include decisional balance (relative weighing of pros and cons), self-efficacy (situation-specific self-confidence), and temptation (intensity of urges to engage in specific habits). This model has been successfully applied to a variety of behaviors involving risky health practices. While parts of the model, such as the early stages and the key constructs, initially appeared to fit the driving reduction and cessation process, it was difficult to adapt this framework to the entire driving reduction and cessation process. Unlike the risky health behaviors that have been studied within the framework of the Transtheoretical Model, driving is not, generally, a risky health behavior. It only becomes a behavior that warrants change when other factors come into play, such as declining abilities or health, that can adversely affect driving performance. Because many of these factors cannot be controlled or overcome, it may be more productive to look at a framework that focuses on how older drivers cope with these declines, as well as their readiness to make changes in response to these declines.

For this reason, the Stress and Coping Model developed by Folkman and Lazarus (1980, 1985), a cognitive-behavioral model that provides a framework for evaluating the processes of coping with stressful events, was examined. According to this model, stressful experiences represent person-environment transactions in which the effects of an external stressor are mediated by a person's appraisal of the stressor and the coping resources available to the person. When faced with a stressor, a person evaluates the potential threat or harm, as well as his or her ability to alter the situation and manage negative emotional reactions. Coping efforts or strategies are undertaken to deal with the stressor and can be directed toward changing the stressful situation or changing the way one thinks or feels about it. The strategies that older drivers use to compensate for declining abilities can be interpreted as coping strategies aimed at altering the situation. The decreased importance of driving among former drivers can also be looked upon as a coping strategy directed toward managing negative emotional reactions. Although this model can address coping strategies associated with driving reduction and cessation, it lacks the structure provided by the stages of the previous model.

The Precaution Adoption Process Model (PAPM; Weinstein, 1988) contains elements from both the Transtheoretical and the Stress and Coping Models that seem applicable to driving reduction and cessation behavior. PAPM identifies a staged process in which people, who are aware of a problem and who recognize their own vulnerability, come to adopt a protective behavior. The stages include

becoming aware of an issue that may cause harm, acknowledging that others are susceptible, acknowledging that one is susceptible, and making a decision about taking a precaution. If the decision is to do nothing, then the process ends, at least for awhile. If the decision is to take action, the behavior is initiated. The last stage is maintenance of the adopted behavior. Coping strategies are embedded in the decisions about protective actions. PAPM could be useful for explaining the driving reduction and cessation process by treating it as an iterative process that includes decisions about compensatory behaviors that occur throughout the driving reduction process as well as the ultimate decision to stop driving. Thus, a PAPM-type model offers the structure of stages and allows for coping strategies.

One distinguishing aspect of the PAPM approach compared to the other two behavior-change models is that it starts with the need for an individual to recognize the possibility of a problem before contemplation of any action can take place. This fits well with the observation-based speculation that the recognition or anticipation of problems with driving ability might be a key factor in the driving reduction and cessation process. Thus, the first step in applying the PAPM approach to driving reduction and cessation is to determine if individuals' anticipation of driving ability problems is related to factors associated with driving reduction and cessation.

### **3. METHODOLOGY**

Questions dealing with the acknowledgment of possible problems with driving ability were included in a 30-minute telephone interview of a random sample of people age 65 and older with current or recently expired driver licenses in the state of Michigan. The telephone survey was part of a multi-year research effort at the University of Michigan Transportation Research Institute regarding the process of driving reduction and cessation among older drivers (Kostyniuk et al., 1998; Kostyniuk and Shope, 1999; Kostyniuk et al., 2000). The survey was preceded by a focus group study (Kostyniuk and Shope, 1998) that identified issues faced by older drivers, defined concepts, and identified dimensions that were used to develop a telephone survey instrument.

Survey questions covered demographics, health, functional status, activities outside the home, and driving-related issues. Current drivers were asked about the amount of driving done, changes in driving, comfort levels in a series of driving scenarios and in performing specific maneuvers, and perceptions of risk. Drivers were also asked about their plans for stopping driving, and behaviors and emotions related to their thinking about stopping driving. Former drivers were asked about their experiences and emotions related to having stopped driving. The responses from the telephone survey were weighted to represent the entire state's population of currently and recently licensed drivers over age 65 who were well enough to respond to the survey. The final data set contains a wealth of information about perceptions, attitudes, and behaviors of people whose driving abilities may be changing or who have stopped driving.

From the focus groups that preceded the telephone survey, it was very evident that facing the possibility of stopping driving is unpleasant or impossible for many drivers and direct questions on the topic were problematic. As a result the telephone survey question about problems with driving ability was worded gently as, "Is there a real chance that your driving ability could become a problem within the next five years?" Cognitive interviews, conducted as part of the survey instrument development, indicated that inquiring only about possibilities of not being able to drive, and then not until five years into the future, was not perceived as threatening and did not make the respondents unduly uncomfortable. Drivers were classified by the three possible responses: no, do not anticipate problems; unsure about problems; and yes, anticipate future problems. Because former drivers had already accommodated to problems with driving ability by stopping driving, they were considered a fourth category for examination of demographics and non-driving behaviors.

This four-level classification was used to examine the general characteristics of the sample, such as age, gender, health, functional status, and participation in activities. Then the driving-related behaviors of drivers, such as changes in the amount of driving, responses to various driving scenarios, and comfort and risk perceptions in certain driving situations were examined. Finally, drivers' plans for stopping driving were examined.

The dependence between the responses to the various questions and respondent categories was explored by contingency table analysis. The null hypotheses of independence was tested on the response frequencies (rejection of null hypothesis is reported at the  $p < .005$  level). Because percentages are easier to compare than numbers in cases where the numbers of respondents in each category are different, tables in this paper show the percent distribution of the responses for survey questions by each category of respondent.

#### 4. SURVEY RESPONDENTS

There were 1,053 respondents who completed the interviews. Overall, the average age was 74.2 years with a standard deviation of 5.9 years. The age of the oldest respondent was 96. Of all respondents, 58% were female, 60% were married, 55% had not gone beyond high school, 71% had annual household incomes below \$50,000, 95% lived in their own homes, 43% did volunteer work, and 12% worked for pay. By race, 92% of the respondents were Caucasian, 5% were African American, and 3% were of other races or refused to answer.

Driving license status and the frequency of driving of the sample is shown in Table 1. The driver license status was not self-reported but was taken from respondents' Michigan driver license records. It is interesting to note that 25% of the respondent who were not licensed to drive reported driving at least occasionally. Of the respondents currently licensed to drive, 85% reported driving regularly and 3% reported not driving at all.

<b>Table 1. Driver license status by frequency of driving</b>		
<i>How often do you drive a car?</i>	Licensed to drive N=1001	Not licensed to drive N=52
Regularly	84%	19%
Occasionally	13%	6%
Do not drive	3%	75%

People who reported driving at least occasionally were classified as drivers in this analysis, and people who did not drive were classified as former drivers, regardless of their driver license status. Table 2 shows the distribution of drivers and former drivers by age and gender.

<b>Table 2. Drivers and former drivers by age and gender</b>				
Age	Drivers N=986		Former Drivers N=67	
	Males	Females	Males	Females
65-74	23.3%	28.8%	3.7%	17.2%
75-84	17.8%	24.3%	7.5%	36.2%
84+	2.6%	3.2%	7.0%	28.4%

Drivers were asked if there was a real chance that their driving ability could become a problem within the next five years. Table 3 shows that close to one-third of the drivers anticipated some problems in their driving ability within five years. Close to 57% did not think that they would have problems in their driving ability in the next five years, and 13% were unsure.

<b>Table 3. Distribution of drivers by driving-problem anticipation (N=966)</b>			
Is there a real chance that your driving ability could become a problem within the next five years?	No	Unsure	Yes
	56.5%	12.5%	31.0%

## 5.0 RESULTS

### 5.1 General characteristics

Age and gender have been associated with driving reduction and cessation (Forrest et al., 1997; Jette and Branch, 1993; Rosenbloom, 1988). Table 4 shows the distribution of age in each of the categories of anticipation of driving-ability problems. Age and anticipation of driving-ability problems were not independent of each other. The table shows that as age increased, so did the likelihood of anticipating problems in one's driving ability or having stopped driving altogether.

<b>Table 4. Age by driving-problem anticipation</b>				
Age	Is there a real chance that your driving ability could become a problem within the next five years?			Do not drive N=67
	No N=546	Unsure N=121	Yes N=299	
65-74	63.2%	46.0%	35.1%	21.0%
75-84	33.8%	45.4%	55.1%	43.7%
85+	3.0%	8.6%	9.8%	35.4%

Table 5 shows the proportions of men and women in each of the categories of anticipation of driving-ability problems. Over 80% of the respondents who did not drive were women. There were no differences by gender between those anticipating problems and those not anticipating problems. The group unsure about problems was different from the other drivers, in that it had a greater percentage (61% compared to 54-56%) of women.

<b>Table 5. Gender by driving-problem anticipation</b>				
Gender	Is there a real chance that your driving ability could become a problem within the next five years?			Do not drive N=67
	No N=546	Unsure N=121	Yes N=299	
Male	44.2%	38.6%	45.6%	18.2%
Female	55.8%	61.4%	54.4%	81.4%

Because the former drivers were likely to be older than the drivers, the higher portion of women in the former driver category can be explained by women's lower mortality rates. However, the larger portion of women in the group that is unsure about future driving problems cannot be explained by age effects and may be related to gender effects in driving reduction and cessation found in other studies (e.g., Rosenbloom, 1988).

Poor health has been associated with driving reduction and cessation (Campbell et al., 1993; Marottoli et al., 1993). Based on data in this study, self-reported overall health and anticipation of driving-ability problems were not independent. Table 6 shows respondents' ratings of their overall health. Over 62% of drivers who did not anticipate problems rated their health as at least very good. Of the other drivers, 50% rated their overall health as at least very good. However, almost half of the former drivers rated their overall health as fair to poor.

<b>Table 6. Self-reported overall health by driving-problem anticipation</b>				
Would you say your overall health is:	Is there a real chance that your driving ability could become a problem within the next five years?			Do not drive N=66
	No N=545	Unsure N=120	Yes N=298	
Excellent	23.2%	17.5%	15.9%	3.2%
Very good	38.9%	31.5%	34.9%	12.2%
Good	30.7%	34.4%	31.2%	35.9%
Fair or Poor	7.2%	16.6%	18.1%	47.8%

Respondents were also specifically asked about their eyesight, both near and far vision, and about their hearing. These were also not independent of anticipation of driving-ability problems. The self-reported near vision, far vision, and hearing of drivers was much better than that of former drivers. The self-reported far vision for drivers who did not anticipate problems appeared to be somewhat better than that of the other drivers. The differences among the three groups of drivers for near vision and hearing were not significant.

Reduced functional status is another factor often associated with driving reduction and cessation (Campbell et al., 1993; Marottoli et al., 1993). Responses to questions on the respondents' ability to walk a half mile and to climb two flights of stairs were found to be independent of the respondents' driving-problem anticipation. Table 7 shows a decrease in the ability to walk this distance as the anticipation of driving problems increased. There was also a clear difference between drivers and former drivers, with 65% of former drivers not very able or not at all able to walk a half mile. Although not shown in table form, a similar overall pattern was found in the self-reported ability of the respondents to climb two flights of stairs.



<b>Table 7. Self-reported ability to walk a half mile by driving-problem anticipation</b>				
How able are you to walk a half mile?	Is there a real chance that your driving ability could become a problem within the next five years?			Do not drive N=66
	No N=544	Unsure N=119	Yes N=297	
Very able	70.8%	64.6%	55.1%	19.0%
Somewhat able	16.1%	20.0%	21.3%	16.1%
Not very able	7.6%	7.2%	11.2%	20.7%
Not at all able	5.5%	8.2%	12.4%	44.2%

Lower frequencies of out-of-home activities are often associated with driving cessation (Gianturco et al., 1974; Rosenbloom, 1988), but not necessarily with driving reduction. Respondents were asked how often they went out for various activities. Table 8 shows the frequencies of trips for shopping, groceries, banking, and other personal business, and Table 9 shows the transportation modes used for these trips.

<b>Table 8. Frequency of going out for shopping, groceries, banking, and personal business by driving-problem anticipation</b>				
How often do you go somewhere for shopping, groceries, banking or personal business?	Is there a real chance that your driving ability could become a problem within the next five years?			Do not drive N=66
	No N=541	Unsure N=121	Yes N=294	
Every day or almost every day	31.5%	26.7%	26.3%	5.4%
3 or 4 times/week	32.7%	39.5%	28.0%	10.7%
1 or 2 times/week	31.1%	28.8%	40.5%	45.6%
A few times a month or less	4.2%	5.0%	5.2%	37.4%

There was little difference in the frequency of these trips among the groups of drivers. Most of them drove themselves, although there appeared to be more of a reliance on rides from the spouse and others among the drivers who anticipated a problem or were unsure if they would have a problem. Former drivers took fewer trips for these activities than did drivers, and when they did make these trips, over 90% of them relied on rides from their spouse or others. The rest of the former drivers either walked or used special transit services such as dial-a-ride for these trips. Although not shown here, similar patterns were found for trips for medical and health care and for social, religious and educational activities.

<b>Table 9. Mode for shopping, groceries, banking, and personal business trip by driving-problem anticipation</b>				
How do you usually get there?	Is there a real chance that your driving ability could become a problem within the next five years?			Do not drive N=66
	No N=539	Unsure N=118	Yes N=293	
Drive self	94.1%	90.3%	89.5%	0.0%
Ride from spouse	5.6%	8.8%	8.7%	31.5%
Ride from others	0.3%	0.9%	1.8%	59.4%
Dial-a-ride/van	0.0%	0.0%	0.0%	4.1%
Walk	0.0%	0.0%	0.0%	5.0%

Respondents were also asked if they had made a long-distance (over 75 mile) car trip in the last year. Table 10 shows that over 70% of drivers made such a trip, regardless of their anticipation of driving problems, compared to 48% of former drivers.

<b>Table 10. Long distance travel by car by driving-problem anticipation</b>				
In the past year, did you go on a trip of over 75 miles?	Is there a real chance that your driving ability could become a problem within the next five years?			Do not drive N=67
	No N=544	Unsure N=121	Yes N=299	
Yes	78.3%	70.9%	77.4%	47.6%
No	21.7%	29.1%	22.6%	52.4%

## 5.2 Driving behaviors

The next section explores aspects of driving reduction in the three driver groups. The amount of driving, changes in the amount of driving, responses to driving scenarios, comfort, and risk perception are examined.

Drivers anticipating problems drove fewer miles than those not anticipating problems. Table 11 shows that 42% of those who anticipated problems reported driving less than 5,000 miles per year, compared to 34% of drivers who did not anticipate problems. However, of the three groups of drivers, those who were unsure about future problems reported driving the fewest miles.

<b>Table 11. Annual mileage by driving-problem anticipation</b>			
How many miles do you drive in a year?	Is there a real chance that your driving ability could become a problem within the next five years?		
	No N=525	Unsure N=113	Yes N=288
< 5,000	33.7%	50.7%	41.9%
5,000 - 10,000	31.9%	23.2%	29.5%
10,001 - 15,000	19.6%	13.1%	18.6%
15,001 - 20,000	10.1%	7.8%	6.9%
>20,000	4.7%	5.2%	3.2%

Table 12 shows respondents' current driving compared to five years earlier. Over 40% of drivers anticipating or unsure about future driving problems reported a decrease in the current annual miles driven compared to the miles driven five years previously.

<b>Table 12. Driving amount compared to five years ago by driving-problem anticipation</b>			
Is this more or less driving than you did five years ago, or is it about the same amount of driving?	Is there a real chance that your driving ability could become a problem within the next five years?		
	No N= 545	Unsure N=120	Yes N=299
More	7.1%	3.7%	5.9%
About the same	64.5%	55.6%	53.0%
Less	28.3%	42.6%	41.1%

Drivers were also asked to compare their present driving ability to their driving ability when they were 50 years old. Table 13 shows that most drivers reported that their driving ability had not changed from when they were 50. However, drivers who anticipated driving problems within five years were more likely than others to rate their present driving ability as worse than it was at age 50.

<b>Table 13. Driving ability compared to self at age 50 by driving-problem anticipation</b>			
How well do you think you drive now compared to when you were 50 years old?	Is there a real chance that your driving ability could become a problem within the next five years?		
	No N=544	Unsure N=119	Yes N=295
Better	13.5%	12.2%	8.0%
About the same	78.6%	82.8%	75.0%
Worse	7.9%	5.0%	17.0%

Drivers were presented with four scenarios involving driving to a very important appointment. For each scenario, respondents were told that the usual or simplest way of getting there was for them to drive themselves. Potentially stressful elements were introduced into the scenario and respondents were asked how (and if) they would make the trip. Respondents were also asked how comfortable they would be if they had to drive in the conditions described in the scenario.

The first scenario involved inclement weather. Drivers were asked how they would change their normal driving if they had to get to an important appointment on a rainy, stormy day. Table 14 shows that most respondents said they would still drive themselves, but would start earlier. Drivers who anticipated problems with their driving ability within the next five years, and those who were unsure about such problems, were less likely to drive themselves and more likely to try to get someone to drive them or to cancel or change the appointment than drivers who did not anticipate problems.

<b>Table 14. Response to inclement weather scenario by driving-problem anticipation</b>			
You must get to a very important appointment. You usually drive by yourself, but its a rainy, stormy day. Would you:	Is there a real chance that your driving ability could become a problem within the next five years?		
	No N=542	Unsure N=121	Yes N=297
Drive yourself, as usual	20.5%	16.2%	15.9%
Drive yourself but start earlier	66.4%	59.4%	62.9%
Try to get someone to ride with you	1.17%	5.1%	3.5%
Try to get someone to drive you	5.8%	10.8%	9.6%
Cancel or change the appointment	6.1%	8.6%	8.1%

Table 15 shows that comfort levels while driving to an important appointment on a rainy, stormy day decreased as the anticipation of future driving-ability problems increased. Of drivers anticipating problems, 34% said that they would be at least somewhat uncomfortable driving in this situation, compared to 39% of those in the unsure category and 23% of those not anticipating problems.

<b>Table 15. Comfort driving in inclement weather by driving-problem anticipation</b>			
If you had to drive yourself, (to a very important appointment on a rainy, stormy day) how comfortable would you be?	Is there a real chance that your driving ability could become a problem within the next five years?		
	No N=543	Unsure N=117	Yes N=297
Very comfortable	41.3%	33.4%	27.4%
Somewhat comfortable	35.5%	27.7%	37.3%
Somewhat uncomfortable	21.1%	30.4%	31.7%
Very uncomfortable	2.1%	8.5%	3.6%

In the other scenarios, drivers were told that they had to get to a very important appointment, but in the first case, they could not use their normal route on a two-lane road and instead they would have to drive on a freeway in heavy traffic; in the second case, their important appointment was 200 miles away in a familiar area; and in the third case, their appointment was 200 miles away in an unfamiliar area. The patterns of responses for these scenarios were similar to those of the first scenario. The majority of

respondents in all three driver groups said that they would drive themselves, as usual. However, the scenario of driving alone for 200 miles in an unfamiliar area elicited higher ratings of discomfort from all three groups of drivers than did the other three scenarios.

Drivers were asked about their comfort levels while performing four specific driving maneuvers: making left turns at busy intersections, merging onto busy freeways, backing up, and keeping up with other traffic. They were also asked how often they drove at night and on freeways and how comfortable they were driving at night and on freeways.

The level of comfort making left turns at busy intersections decreased as the anticipation of driving-ability problems increased from no anticipation, to unsure, to anticipation (Table 16). Of drivers not anticipating problems, 9% said they were uncomfortable making left turns at busy intersections, compared to 13% of those unsure, and 21% of those anticipating problems.

<b>Table 16. Comfort making left turns at busy intersections by driving-problem anticipation</b>			
How comfortable are you making left turns at busy intersections?	Is there a real chance that your driving ability could become a problem within the next five years?		
	No N=544	Unsure N=120	Yes N=295
Very comfortable	65.1%	52.2%	46.8%
Somewhat comfortable	26.3%	34.2%	32.5%
Somewhat uncomfortable	7.7%	11.7%	16.6%
Very uncomfortable	0.9%	1.7%	4.1%

Although not shown in table form, drivers anticipating or unsure about future problems were also more likely to be uncomfortable merging onto busy freeways, backing up, and keeping up with other traffic. However, of the driving maneuvers explored, keeping up with other traffic was the least comfortable situation for all the drivers.

Reduction of driving at night is still another factor associated with reduction and cessation of driving (Benekahal et al., 1994; Gianturco et al., 1977; Kington et al., 1994). The drivers were asked how often they drove at night. Table 17 shows that respondents who did not anticipate problems were more likely than others to report often driving at night. Of drivers who anticipated or were unsure about future problems, about 13% never drove at night, compared to 4% of those who did not anticipate problems.

<b>Table 17. Frequency of driving at night by driving-problem anticipation</b>			
How often do you drive at night?	Is there a real chance that your driving ability could become a problem within the next five years?		
	No N=544	Unsure N=121	Yes N=298
Often	34.2%	19.7%	21.0%
Occasionally	47.6%	47.6%	42.4%
Rarely	14.6%	21.6%	23.9%
Never	3.6%	11.2%	12.7%

Drivers who reported driving at night were asked how comfortable they were doing so. Table 18 shows that very few were very uncomfortable, presumably because those drivers who were very uncomfortable no longer drove at night. However, over 30% of drivers who anticipated or were unsure about future problems said they were somewhat uncomfortable, compared to 18% of those who did not anticipate problems.

<b>Table 18. Comfort driving at night by driving-problem anticipation</b>			
How comfortable are you driving at night?	Is there a real chance that your driving ability could become a problem within the next five years?		
	No N=524	Unsure N=108	Yes N=262
Very comfortable	40.5%	28.6%	23.0%
Somewhat comfortable	37.9%	35.9%	36.9%
Somewhat uncomfortable	18.3%	30.1%	34.3%
Very uncomfortable	3.4%	5.4%	5.8%

Nervousness about driving has also been associated with driving reduction and cessation (Benekohal et al., 1994; Lonero et al., 1994; Persson, 1993; Stewart et al., 1993). Drivers were asked how much they worried about various risks associated with driving. These risks included the perceived risk to personal safety and security, and the perceived risks of a crash, of hurting someone else, of getting lost, and of getting confused while driving. Although not shown here in table form, overall perception of these risks was quite low for all drivers. Few drivers reported worrying much about personal safety and security while driving. However, drivers who anticipated problems were more likely than other drivers to worry “some” about personal safety and security. The perceived risk of not being able to avoid a crash was independent of driving problem anticipation with approximately 12% of all drivers reporting that they worried a lot about their ability to avoid a crash.

Worrying about hurting someone else increased with driving problem anticipation. About half the drivers who anticipated or were unsure about future problems were likely to worry at least “some” about hurting someone else while driving, compared to 38% of drivers who did not anticipate problems. Most drivers, regardless of the level of anticipation of driving problems, did not worry about getting lost or getting confused while driving.

### **5.3 Planning for stopping driving**

There is evidence from qualitative studies that older drivers do little to plan for the time that they are unable to drive (Burkhard et al., 1998; Kostyniuk and Shope, 1998). In the present study, drivers were asked how much thought they had given to what they might do if they had to stop driving. Table 19 shows that drivers who anticipated problems appeared to be nearly five times more likely to have thought “a lot” about stopping driving and twice as likely to have “thought some” about stopping driving than those who did not anticipate problems.

<b>Table 19. Amount of thought about stopping driving by driving-problem anticipation</b>			
How much have thought about what you might do if you had to stop driving?	Is there a real chance that your driving ability could become a problem within the next five years?		
	No N=544	Unsure N=118	Yes N=299
A lot	2.6%	3.8%	13.8%
Some	21.1%	28.0%	38.9%
A little	31.3%	24.1%	29.1%
Not at all	45.1%	44.1%	18.3%

Drivers who had thought at least “a little” about what they might do if they had to stop driving were asked if they thought about anything specific that they might do. There was no difference across the categories of driving-problem anticipation, with approximately half of the drivers stating that they had thought about specific actions.

Respondents who said that they had thought about specific things they might do if they had to stop driving were asked if they had thought about the following:

- C Moving somewhere with better public transportation services
- C Moving to senior housing with transportation
- C Moving closer to children
- C Making arrangements for rides
- C Learning more about public transportation

The distribution of responses to these possible actions is shown in Table 20. An example helps to interpret the table. The first cell shows that 33% of those respondents who did not anticipate driving problems had thought about moving somewhere with better public transportation services. The table shows that about one-third of those who had thought specifically about what they might do if they have to stop driving thought about moving someplace with better public transportation or to senior housing with transportation. About 20% had thought about moving closer to their children, and about 30% had thought about learning more about public transportation. There was no difference among the respondents regarding these specific actions by their anticipation of problems. There were differences, however, by this classification, when thinking about arranging for rides and/or hiring someone to drive. Drivers who anticipated problems were more likely to have thought about arranging for rides and hiring someone to drive than those who did not anticipate problems.

<b>Table 20. Percentage who thought about specific action by driving-problem anticipation*</b>			
Yes, have thought about the following:	Is there a real chance that your driving ability could become a problem within the next five years?		
	No	Unsure	Yes
Moving somewhere with better public transportation services	32.9% N=155	31.4% N=31	35.7% N=130
Moving to senior housing with transportation	33.5 % N=155	37.7% N=30	32.5% N=129
Moving closer to children	19.8% N=153	17.7% N=29	20.9% N=128
Making arrangements for rides	23.1% N=156	39.1% N=31	45.2% N=130
Hiring someone to drive	8.6% N=156	26.1% N=31	17.8% N=130
Learning more about public transportation	30.1% N=153	28.0% N=31	27.4% N=130

\*Respondents could select more than one action.

## 6. TOWARD A BEHAVIORAL FRAMEWORK

The objective of this research effort was to start developing a behavioral framework of driving reduction and cessation among older drivers. Several candidate behavior-change models from the field of public health were examined for their applicability. These included the Transtheoretical Model, the Stress and Coping Model, and the Precaution Adoption Process Model. PAPM included the characteristics of the other two models most applicable to driving reduction and cessation and appeared to be the best candidate for providing a framework of the driving reduction and cessation process.

PAPM is different from the other models considered in that it starts with the need of individuals to be aware of the general problem, and to acknowledge their own susceptibility before considering measures to minimize harm. Before proceeding to develop a conceptual framework of the driving reduction and cessation process based on PAPM, the assumption of acknowledgment of susceptibility was tested on data from a telephone survey of 1,053 older drivers and former drivers from the state of Michigan.

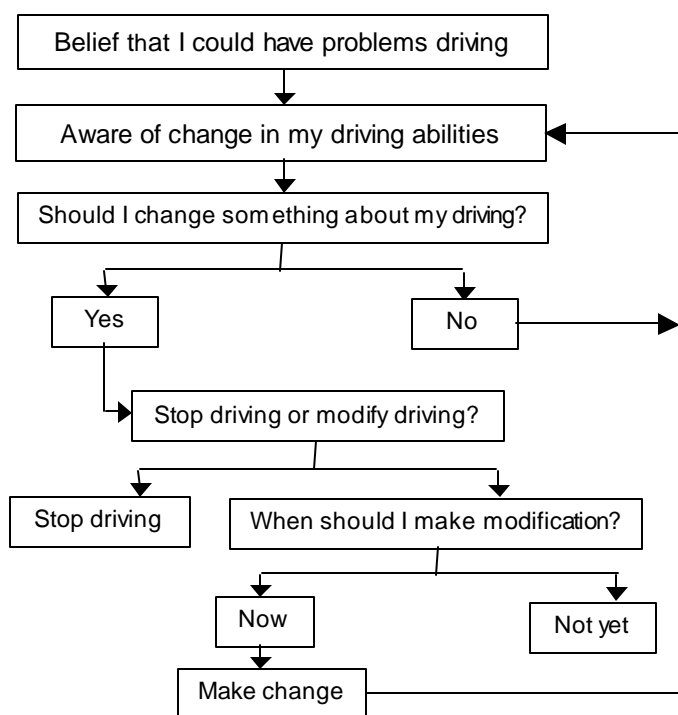
Because facing the possibility of stopping driving is unpleasant or impossible for many older drivers, their acknowledgment of susceptibility was assessed with a gently-worded question. Responses to this questions discriminated well among behaviors associated with driving reduction, such as amount and reduction of driving, and avoidance of and discomfort of driving under adverse conditions. These factors were observed to be related to the responses to this question, as were other factors such as self-reported overall health, vision, and functional status. Responses to this question also confirmed lower participation in out-of-home activities and long-distance trips among former drivers, compared to current drivers, and were related to the reliance on obtaining rides for these activities. The results from this study were also in agreement with other studies that indicate that drivers are not likely to make specific plans for the time when they can no longer drive. However, use of the question on anticipation of future problems indicated that drivers anticipating problems were more likely than others to have started thinking in general about what they might do if they could no longer drive.

The results of the analysis indicated that the degree to which drivers recognize or anticipate problems is related to their driving reduction and cessation. This supports the assumption that the acknowledgment of potential problems in driving ability may be the underlying factor in the driving reduction and cessation process, satisfying the initial condition in the PAPM framework.



The following figure adapts the PAPM model to the driving reduction and cessation process. The process depicted below starts when a driver acknowledges the possibility of future problems in driving ability. At some point, the driver becomes aware of increasing difficulties, for example, when driving at night or merging onto a freeway in busy traffic. At first, the difficulties are not great enough to warrant change, but eventually the driver will start avoiding these situations. The driver will continue to drive and periodically will modify his or her driving behavior, (i.e., when, where, and how he or she drives). The process continues and eventually stopping driving may become a very real possibility. The data collected in this research study offer opportunities to further the understanding of the process of driving reduction and cessation by testing and refining the proposed behavioral framework.

The results of this exploration support the idea that the degree to which drivers report anticipating problems in their future driving ability helps to identify where people are in the driving



**Figure 1. Driving reduction/cessation process**

they would have driving-ability problems within the next five years provides an interesting example. Members of this group were more likely to be female, to be older than the drivers who did not anticipate problems but younger than those who anticipated driving problems, and to have driven less frequently and fewer miles than even the drivers who anticipated driving problems. These drivers appeared to be relying on obtaining rides and avoiding driving under adverse conditions more than other drivers. They also appeared to be less comfortable and less confident than other drivers. In a recent focus group study, Wilkins et al. (1999) found similar characteristics in women who had stopped driving prematurely, i.e., before their driving abilities actually made it necessary. Some of these women in the Wilkins et al. study were able to start driving again after a program of driving evaluation and retraining.

The data collected in this research study are cross-sectional and as such are limited when developing a process model. An interesting observation regarding this study is that only people capable of doing a lengthy telephone interview could be included. People in the midst of a health crisis, who were not capable of doing such an interview and were therefore not included in the survey, are usually also undergoing changes in driving ability. The study aimed to learn about the entire driving reduction

reduction/cessation process. Those who anticipate driving problems seem closer to the point of driving reduction or cessation. The degree to which drivers anticipate problems in their driving ability may also mark transitions along the process, and as such, may be a useful tool for identifying people ready for possible interventions to help them reach appropriate decisions about driving. Those who do not anticipate problems would be less interested in discussing preparations for stopping driving or in alternatives to driving. If there were a reason they should stop driving, due to their lack of readiness, different approaches would be needed to accomplish cessation.

The proposed process model also provides a framework for examining the driving-reduction process, in particular, the compensating (coping) behaviors, and how they vary across the population. In this study, the group that was unsure if

process, yet, the survey captured primarily the time before and after such critical events that could affect driving. Information could not be obtained close to the time of actual transitions in driving ability and behavior through a telephone survey methodology. People who have recovered sufficiently from a health crisis to participate in a survey may report recollections that are different from what actually occurred. They may have accepted their new status and report their experiences and emotions differently than they would have during the crisis. In effect, they have resolved their cognitive dissonance (Festinger, 1957). This is a constraint of the cross-sectional approach used in this research.

One way of overcoming this problem is by implementing a longitudinal study of older drivers. A longitudinal study could track individuals over time through the driving reduction and cessation process. This approach would obtain a more detailed record of the changes, reactions, and adjustments over time as they actually occur. Even a small sample size with an in-depth study could yield much valuable information and help refine the process model.

A behavioral framework offers a rich contribution to the general understanding of the driving experiences of the driving population 65 years of age and older. It should be valuable in the planning and implementing of programs to assist drivers in adjusting to their changing driving abilities, and in making plans for sustaining their mobility to meet their transportation and other needs that enhance the quality of life.

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